

EMPHNET
The Eastern Mediterranean Public Health Network

امفنت
الشبكة الشرق أوسطية للصحة المجتمعية

INSIGHTS

May 2026

Defeating Meningitis

Progress and Persistent Gaps in the Eastern Mediterranean Region

1. Introduction: The Global Burden of Meningitis

Meningitis causes deaths and lasting disability despite effective vaccines, antimicrobial treatment and diagnostic tools. In the Eastern Mediterranean Region, public health priorities include equitable prevention, rapid access to treatment, reliable disease surveillance and continuity of care for survivors. This report reviews the evidence behind these priorities and identifies practical actions for health authorities, health services and communities.



1.1 What meningitis is and why it matters

Meningitis is inflammation of the membranes surrounding the brain and spinal cord. Infectious causes include bacteria, viruses, fungi and parasites. Although its causes and clinical course vary, acute bacterial meningitis is particularly important because it can progress rapidly, cause death within hours and leave survivors with lasting disability. Four important bacterial causes are Neisseria meningitidis, Streptococcus pneumoniae, Haemophilus influenzae type b and Streptococcus agalactiae, also known as group B streptococcus. [1,2]

This report examines the global burden of meningitis and its implications for the Eastern Mediterranean Region, followed by existing prevention and control efforts and the gaps that limit their impact. The regional evidence shows substantial progress alongside unequal access to vaccination, diagnosis and long-term care. Bacterial meningitis is the main focus because of its severity and the opportunities for prevention, while survivor care also applies to meningitis from other causes. [1,2]

1.2 Global cases deaths and long term disability

A 2026 analysis of the Global Burden of Disease Study 2023 estimated 2.54 million incident meningitis cases worldwide in 2023, with a 95% uncertainty interval of 2.20–2.93 million. It estimated 259,000 deaths, with an uncertainty interval of 202,000–335,000. Children younger than five years accounted for approximately 86,600 deaths, more than one third of the estimated total. These are modelled estimates for 2023, rather than cases reported during 2026, and their uncertainty reflects limitations in the underlying data and estimation methods. [3]

Mortality alone does not capture meningitis's impact. Around one in six people with bacterial meningitis die and approximately one in five survivors experience lasting after-effects. These can include hearing loss, seizures, impaired vision, limb weakness and difficulties with memory, language or communication. Meningococcal sepsis may also cause scarring and limb loss. The effects can disrupt education, employment and family life long after the acute infection has resolved. [4]

Recent research strengthens the evidence for follow-up. A 2026 systematic review and meta-analysis of formal hearing assessments included 41 studies and 8,105 patients with infectious meningitis. It found considerable variation in when hearing was assessed and supported coordinated testing at discharge and during follow-up. Differences in patient selection, age, testing methods and assessment timing mean that its findings should not be treated as a single universal rate of permanent hearing loss. [5]

1.3 Why meningitis remains a public health priority

Meningitis remains a priority because severe disease can occur quickly, outbreaks require coordinated action, and effective preventive tools do not reach all populations equally. The global Defeating Meningitis by 2030 initiative seeks to eliminate bacterial meningitis epidemics, reduce cases of vaccine-preventable bacterial meningitis by 50% and deaths by 70%, and reduce disability while improving quality of life after meningitis from any cause. [2,6]

Meningitis prevention and control connects five areas of action: prevention and epidemic control, diagnosis and treatment, disease surveillance, care and support, and advocacy and engagement. This approach recognizes that vaccination alone cannot address all meningitis causes or the needs of people who survive. The approach has developed alongside advances in vaccination, diagnostic practice and survivor care. [1,2,7]

02

Regional Evidence and Priorities for Implementation

The Eastern Mediterranean Region has made progress against meningitis, but differences in resources, service coverage and access continue to shape outcomes. Regional estimates published in 2025 indicate that all-cause incidence declined from 74 to 34 cases per 100,000 population between 2000 and 2021, approximately 52%, while mortality declined from eight to three deaths per 100,000, approximately 61%. These estimates indicate improvement alongside a continuing burden. [2]

The following themes bring together regional evidence, country assessments, and discussions from the webinar on operationalizing national meningitis plans. They draw on contributions from Dr. Messeret E. Shibeshi, Immunization Officer at the WHO Regional Office for the Eastern Mediterranean; Katya Fernandez, Technical Officer for Bacterial Epidemic Diseases at the WHO Health Emergencies Programme; Prof. Ener Cagri Dinleyici, Professor of Pediatrics at Eskisehir Osmangazi University, Türkiye; Prof. Amjad Mahboob, Professor and Head of Infectious Diseases at Bacha Khan Medical College, Pakistan; and Dr. Magid Al-Gunaid, Deputy Executive Director of EMPHNET. The webinar was moderated by Prof. Muhamed-Kheir Taha, Head of the Invasive Bacterial Infections Unit at Institut Pasteur, France. Together, these contributions explore how existing achievements can be translated into more consistent and sustained implementation. [17]

2.1 Strengthening regional collaboration, national ownership and sustainability

Meningitis crosses borders through travel and population movement, while the capacity to detect and respond to it remains uneven. Regional cooperation can help close that gap by connecting countries with expertise, testing and practical experience that may be difficult to sustain independently. Its value depends on whether those connections strengthen everyday national services.

MenMap offers an example. In its first year, from December 2023 to November 2024, the network linked 16 sentinel hospitals in Jordan, Egypt and Iraq and recorded 2,104 suspected paediatric cases, including 191 laboratory-confirmed cases. These hospital-based findings cannot establish national incidence, but they provide evidence that can strengthen understanding of the pathogens being detected. Regional laboratory arrangements also offer a foundation: the assessment documented IB-VPD sentinel surveillance in Afghanistan, Pakistan, Sudan and Yemen, participation by 16 countries' national reference laboratories in international external quality assurance, and a regional quality-assurance scheme distributed by Oman. [2]

For Dr. Magid Al Gunaid, the significance of MenMap extended beyond the project itself. Describing how participating countries took the work forward, he noted that "these three countries continued as a national initiative." The experience illustrates a condition for sustainability: external collaboration should help build functions that national institutions can own, resource and maintain. [17]

Dr. Messeret's proposals for laboratory exchanges and communities of practice, Miss Katya Fernandez's emphasis on peer learning, and Prof. Muhamed Kheir

Taha's offer of support through WHO collaborating centres all reflected this practical purpose. Such cooperation can make reference testing, mentoring and quality assurance available more consistently, while giving countries a way to learn from implementation difficulties as they arise. [17]

Cross-border preparedness is particularly relevant to Hajj and Umrah. The detection of Umrah-associated meningococcal disease abroad in 2024, including ciprofloxacin resistance, demonstrated why prevention and investigation require coordination between countries of departure, exposure and return. Regional experience with vaccination, risk assessment and mass-gathering preparedness provides a basis for this work. [2,10]

National ownership must also extend to those delivering and using services. Private hospitals need links to surveillance and shared standards; community organizations, survivors and families need a voice in decisions that affect access and continuing care. Their involvement makes national plans more responsive to the realities that routine administrative reporting may overlook. [2,6,17]

2.2 Moving from national plans to funded and accountable implementation

The development of a national plan is an important expression of commitment. Its influence becomes clearer when facilities have the staff, supplies and referral arrangements needed to act on it. This was a recurring concern in the webinar: planning had advanced, but the resources and accountability needed for delivery had not always kept pace.

Dr. Messeret put the financing problem directly: "We have noticed there was limited costing and financial plans for the country plans." She also identified inconsistent surveillance indicators and limited monitoring arrangements. These weaknesses make it difficult to establish what will be delivered, who is responsible and whether implementation is improving services. [17]

Embedding meningitis priorities within existing health and immunization strategies offers a practical route forward. It connects activities with established budgets and management systems and reduces the burden of maintaining a separate program. In decentralized systems, responsibilities also need to be clear below the national level. Prof. Amjad Mahboob's account of Pakistan showed how coordination across territories with their own health-management responsibilities affects the feasibility of implementation. [17]

Miss Katya Fernandez called for "focusing on some really key and catalytic activities where you can show progress more rapidly." Her point gives direction to countries facing a long list of needs: select a manageable sequence of actions, cost them and establish how their delivery will be assessed. A comprehensive plan can then guide sustained improvement without leaving every activity competing for immediate attention. [17]

Vaccination demonstrates why technical priorities and financing must be considered together. Dr. Al Gunaid described how local evidence can strengthen the case for vaccine introduction, while affordability remains a barrier for some middle-income countries. Miss Fernandez also discussed constraints on external support and the need to consider targeted strategies. Evidence can support a funding decision, but implementation still requires dependable procurement and a budget that sustains delivery. [17]

Accountability should therefore reach beyond whether a plan has been approved or a workshop completed. It should examine whether reporting is timely, diagnostic services are accessible and patients receive appropriate follow-up. Prof. Muhamed Kheir Taha captured the task in his closing remarks: "The next phase is to turn those plans into funded, coordinated and measurable action." [17]

2.3 Ensuring continuity of care and support for meningitis survivors

For survivors and their families, leaving hospital may mark the beginning of a different set of difficulties. Hearing loss, cognitive changes and problems with movement or communication can affect education, employment and daily life. Some consequences become apparent only later, particularly when a child enters or returns to school. Regional evidence describes limited capacity to recognize these needs and provide rehabilitation, while a recent hearing review found substantial variation in assessment timing. [2,5]

Dr. Messeret described the break in care that can follow discharge: "No link to the available services." The problem is not always the complete absence of

services. Families may be unaware of them, lack a referral or face costs and travel that make attendance difficult. Dr. Al Gunaid highlighted the limits of relying on distant tertiary hospitals and proposed exploring rehabilitation activities within primary healthcare, supported by staff training and budgets for practical needs such as hearing aids. [17]

Prof. Ener Cagri explained how complications can also disappear from the view of the original treating team. A survivor may later attend an ear, nose and throat specialist, a paediatrician or a family physician, leaving the hospital that managed the acute infection unaware of the outcome. He emphasized that "we need to follow up the disease burden of this condition" to understand its longer-term consequences. Prof. Taha extended the discussion to learning difficulties and the importance of linking follow-up records with the original episode. [17]

Miss Katya Fernandez identified survivor care and monitoring of after-effects as comparatively recent priorities where progress has been difficult. The Sudan workshop findings, which described an absence of specialized sequelae services and a rehabilitation referral pathway, illustrate the scale of the challenge in one setting. A lack of recorded complications cannot be assumed to mean that survivors have recovered without further needs. [15,16,17]

Continuity requires a recognizable pathway from discharge to assessment, referral and support. Connecting hospital teams, primary healthcare, rehabilitation services and families would help ensure that needs are identified and followed over time. Involving survivors in the design of these pathways can also bring attention to stigma, financial pressures and barriers to participation that clinical records alone may miss. [2,6,17]

2.4 Adapting implementation to fragile and resource-constrained settings

The regional burden is especially concerning where health services are least able to absorb disruption. Modelled all-cause incidence estimates for 2021 ranged from 180 cases per 100,000 population in Somalia to 79 in Djibouti, 58 in Pakistan, 49 in Afghanistan and 23 in Sudan. These estimates are not current notification rates, but they underline that substantial risk extends beyond the African meningitis belt, within which Sudan is the Region's only country. [2]

Conflict and displacement affect several protective systems at once. Overcrowding can increase exposure, vaccination may be interrupted, and insecurity can delay access to care and weaken reporting. The Sudan workshop slides reported that 64% of facilities were outside weekly surveillance reporting and that two of three immunization-programme sentinel sites had been destroyed during the war beginning in 2023. These source-specific findings illustrate disruption in Sudan and should not be generalized across the Region. [2,9,16]

Drawing on experience in southeastern Turkey, Prof. Ener Cagri observed that "geopolitical instability area affects the disease surveillance system and affects the vaccination." He called for stronger border surveillance and highlighted the consequences of interrupted care for children, pregnant women and people with chronic conditions. Prof. Amjad Mahboob similarly described the effects of population movement, disasters and refugee movements in Pakistan. Their accounts connect meningitis preparedness with the continuity of wider health services. [17]

In such circumstances, implementation needs to begin with what can function reliably. Dr. Magid Al Gunaid asked: "How can you make an optimal utilization of available resources?" His emphasis on political commitment and integration points towards using existing staff, facilities and partner arrangements more effectively. Prof. Mahboob's proposal to strengthen selected centres and expand progressively offers one way of matching ambition to available capacity. [17]

Timely clinical care remains essential within this approach. Country assessments described delayed recognition, referral and case management, alongside shortages of diagnostic materials and uneven access to medicines. The regional review also found recommended first-choice antibiotics absent from the essential medicines lists examined for Somalia and Yemen, although this does not establish their absence from every facility. Practical pathways, supported frontline staff and dependable supplies are therefore central to implementation; diagnostic procedures must not delay urgent treatment when bacterial meningitis is suspected. [1,2,8]

Community engagement needs the same attention to local circumstances. Mobile populations, language differences and disrupted services can make information and care harder to reach. Working through trusted community channels can support vaccination and early care-seeking, while helping services distinguish concerns about vaccines from practical difficulties obtaining them. [2,6]

2.5 Integrating surveillance, laboratory systems and evidence-informed vaccination decisions

Vaccination has established a strong foundation for prevention. By 2023, all 22 countries and territories had introduced Hib vaccine and 18 had introduced pneumococcal conjugate vaccines. Meningococcal programmes varied more widely. Yet introduction and protection are different achievements: the regional assessment reported meningococcal coverage of 51% in Sudan, compared with at least 90% in Bahrain, Libya, Saudi Arabia and the United Arab Emirates. Pneumococcal coverage also varied, and national averages can conceal missed communities. [2]

The June 2026 country assessments identified gaps involving older adults, increased-risk groups, school-age vaccination, refugee children, travellers and migrant workers. They also raised supply constraints, vaccine hesitancy and weaknesses in group B streptococcal burden estimates, screening or monitoring. Addressing these needs requires information that connects disease patterns with vaccination coverage and the populations being missed. [8]

That connection remains incomplete. Dr. Messeret described separate systems for disease reporting, emergency surveillance, laboratory results, antimicrobial resistance and immunization monitoring. Prof. Amjad Mahboob explained what this fragmentation can mean in practice: “I mean they actually end up in counts at the end of the day.” A total number of suspected cases offers limited guidance when the responsible organisms, affected groups and patient outcomes remain unknown. [17]

Laboratory access is a critical part of that gap. “You can have good diagnostic capacity in the major cities, but in the peripheries it is very challenging,” Prof. Mahboob observed. Weaknesses in specimen collection and transport, reagent supply, staffing and communication can undermine confirmation even where testing equipment exists. Dr. Messeret’s proposed links between diagnostic services, national reference laboratories and regional networks provide a way to distribute functions while supporting quality. [8,17]

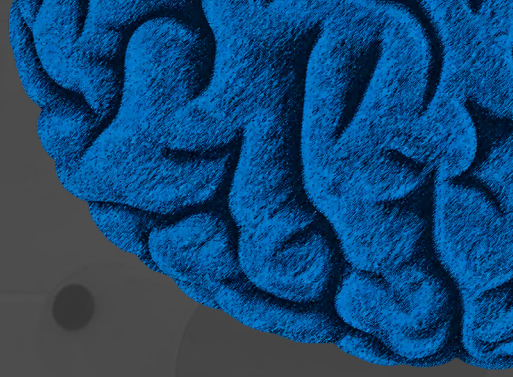
Prof. Ener Cagri emphasized the need for suitable specimens before advanced analysis is possible, while discussing how previous antibiotic exposure complicates organism recovery. Prof. Mahboob noted that patients may already have taken non-prescribed medicines before reaching care. Prof. Muhamed Kheir Taha added that susceptibility-testing methods need harmonization if resistance findings are to be compared. The practical lesson is to connect clinical and laboratory work without compromising urgent treatment. [1,17]

Determining the cause also matters during outbreaks. Investigation of the 2023 paediatric outbreak in Halabja, Iraq, found that enterovirus predominated, with a small proportion of pneumococcal cases. Such findings show why a meningitis cluster cannot automatically be assumed to be meningococcal, and why response decisions depend on laboratory and epidemiological evidence. Missing information presents a separate problem: absent notification data must not be read as an absence of disease, nor should modelled burden estimates and reported cases be treated as interchangeable measures. [2,8]

For vaccine selection, Prof. Ener Cagri used Turkey’s experience to show how serogroup surveillance could challenge assumptions made when considering a serogroup C vaccine. Prof. Taha similarly highlighted gaps in pneumococcal serotype distribution, age-specific information and sample representativeness. These details help countries judge which products best address the disease they are detecting. [17]

Where national evidence is limited, neighbouring-country findings can offer context, but their limitations must remain visible. As Prof. Cagri stated, “every country requires their own surveillance and their own implementation strategies.” Dr. Messeret’s discussion of risk assessment informing Sudan’s proposed move towards broader meningococcal vaccine coverage illustrated this link between evidence and planning, while distinguishing a proposed change from completed implementation. Stronger surveillance and vaccination can advance together, with each helping countries refine the other. [17]





03

Recommendations

Operationalize national plans through costed priorities, designated responsibilities, secured financing and measurable indicators, integrated into existing health and immunization strategies.

Link case-based surveillance, laboratory results and immunization data, with standardized reporting across public and private providers. Prioritize specimen referral, quality assurance and antimicrobial resistance monitoring.

Target vaccination gaps using subnational coverage and disease data, supported by age-specific serogroup and serotype surveillance, sustainable procurement and outreach to underserved populations.

Standardize care from presentation to follow-up, ensuring prompt treatment, clear referral pathways, hearing assessment and access to neurological, developmental and rehabilitation services.

Adapt implementation to local capacity, prioritizing feasible actions in resource-constrained settings and using regional laboratory networks, coordinated partner support and cross-border reporting to address identified gaps

04

Conclusion

The Eastern Mediterranean Region has made progress against meningitis, but gains remain uneven. Gaps in vaccination, laboratory confirmation, timely treatment and continuing care leave preventable illness, death and disability insufficiently addressed, particularly in fragile and underserved settings.

The regional evidence and webinar discussion point to a clear implementation priority: national commitments must be supported by sustained financing, defined responsibilities and services that work together. Linking surveillance with laboratory and immunization data can strengthen prevention decisions, while coordinated referral and follow-up can ensure that survival is followed by appropriate care.

Regional collaboration can help countries address shared technical challenges, but lasting progress depends on national ownership and delivery suited to local capacity. Success should be judged by fewer preventable cases and deaths, more equitable access to care and better quality of life for survivors.



Watch the Webinar

Operationalizing National Meningitis Plans:

Addressing Key Implementation Challenges to Defeat Meningitis by 2030 in the EMR



05

References

1. World Health Organization. WHO guidelines on meningitis diagnosis, treatment and care: executive summary. Geneva: WHO; 2025. doi:10.2471/B09452.
2. World Health Organization Regional Office for the Eastern Mediterranean. Framework for implementing the Defeating Meningitis by 2030 global road map in the Eastern Mediterranean Region. Regional Committee version. October 2025
3. Sirota SB, Bender RG, Dominguez RMV, et al. Global, regional, and national burden of meningitis, its risk factors, and aetiologies, 1990–2023: a systematic analysis for the Global Burden of Disease Study 2023. Lancet Neurol. 2026;25(5):451–468. doi:10.1016/S1474-4422(26)00101-8. https://pubmed.ncbi.nlm.nih.gov/41911930/
4. World Health Organization. Meningitis. Fact sheet. 29 September 2026. https://www.who.int/news-room/fact-sheets/detail/meningitis
5. Alviz LF, Kim CY, Benevides-Tadinac AC, et al. Detection of hearing loss by formal audiological testing after acute infectious meningitis: a global systematic review and meta-analysis. BMC Med. 2026;24:135. doi:10.1186/s12916-026-04698-y. https://link.springer.com/article/10.1186/s12916-026-04698-y
6. World Health Organization. Developing national meningitis plans: an operational manual. Geneva: WHO; 2024. ISBN 978-92-4-009428-4.
7. World Health Organization. Defeating meningitis by 2030: baseline situation analysis. 20 February 2019. Supplied PDF.
8. World Health Organization Regional Office for the Eastern Mediterranean. EMR meningitis country profiles. Compilation dated 29 June 2026.
9. World Health Organization. Vaccination in humanitarian emergencies: implementation guide. Geneva: WHO; 2017. WHO/IVB/17.13.
10. Badur S, Khalaf M, Öztürk S, et al. Meningococcal disease and immunization activities in Hajj and Umrah pilgrimage: a review. Infect Dis Ther. 2022;11:1343–1369. doi:10.1007/s40121-022-00620-0.
11. Haidara FC, Umesi A, et al. Meningococcal ACWYX conjugate vaccine in 2-to-29-year-olds in Mali and Gambia. N Engl J Med. 2023. doi:10.1056/NEJMoa2214924. https://www.nejm.org/doi/full/10.1056/NEJMoa2214924
12. World Health Organization. Standard case definitions of acute bacterial meningitis and invasive meningococcal disease for routine and outbreak surveillance. Geneva: WHO; 2025. doi:10.2471/B09491.
13. World Health Organization. Preparedness and response to bacterial meningitis outbreaks: toolkit for frontline healthcare workers. Geneva: WHO; 2026. doi:10.2471/B09660.
14. Pan American Health Organization. Frequently asked questions on meningococcal disease. Washington, DC: PAHO; 2021. PAHO/FPL/IM/21-0030
15. World Health Organization. Global status report on neurology. Geneva: WHO; 2025. ISBN 978-92-4-011613-9..
16. Operationalizing National Meningitis Plans Addressing Key Implementation Challenges to Defeat Meningitis. Webinar transcript supplied with this report.